PRECIPITATION

The fortnight from the 3d to the 16th was notable for heavy precipitation for the region over most of southern California and Arizona. During the same time well-distributed moderate to heavy rain reached most of the near Southwest, the central valleys and the southern drainage of the Ohio River. Several scattered areas received much precipitation during the last three days of the month.

February, as a whole, brought considerably more moisture than January had, yet for more than half of the country there was less than normal. In many eastern and central districts the precipitation was well distributed through the month and fell at a gentle to moderate rate, the soil thus getting great benefit for the quantity.

The inset on Chart No. V shows the monthly distribution with respect to the normal.

At Cairo, Ill., and Springfield, Mo., the monthly amounts were greater than normal for the first time since January, 1930.

The precipitation of the past winter (December to February, inclusive) is noted as the least of any winter of record at several places in the north-central portion of the country; likewise at some localities in northern California.

SNOWFALL

The snowfall was usually light for February, save in a few States. The middle and southern portions of the Rocky Mountain area mainly had more than normal, while from central North Dakota eastward to New England, the more northern States usually had from one-half to seven-eighths of normal amounts.

The snowfall was light and largely negligible over the southern half of the Middle Atlantic States, practically all of the Ohio Valley, the middle and much of the upper Mississippi Valley, and almost all the Plains. Most of Montana received but very light snowfall, while the Plateau and Pacific States nearly everywhere received much less than normal. When February ended, the stored snow in the elevated portions of the West was in almost every area less than the average quantity and in several States about as little as had ever before been noted at this time of year.

SUNSHINE AND RELATIVE HUMIDITY

Throughout much of the East and Southeast, and the northern portions of the Great Plains more than the normal amount of sunshine was received during the month, while in the Southwest and central Rocky Mountain region and to the westward, much cloudy weather prevailed. Elsewhere, about the usual amount of sunshine was received. The relative humidity was below the normal generally in the Southeast, much of the East, the Missouri Valley and far Northwest, while in the Southwest and the central and southern portions of the Rocky Mountain and Plateau regions it was above normal. The plus departures were rather large in the far Southwest, as would be expected from the abnormal rainfall received in that region.

SEVERE LOCAL STORMS, FEBRUARY, 1931

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path, miles	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
El Dorado, Kans.	6	10 a. m.	2			Heavy hail	Some damage to wheat; path 14 miles long	Official, U. S. Weather Bureau.
Toledo, Ohio	7	3 a. m.-1:15 p. m.				Ice	Minor damage to trees and wires	Do.
Iowa (southern)	7					Blizzard	Numerous automobile accidents; motor and rail transportation interrupted.	Do.
Canaveral Lighthouse, Fla. (near).	17				$8,000	Winds	4 fishing boats beached	Do.
Sealy, Tex.	28	7 p. m.	4		1,500	Hail	Crops injured	Do.

RIVERS AND FLOODS

By MONTROSE W. HAYES

There were no overflows of importance in February, 1931. In Georgia, especially during the latter half of the month, there was enough rain to cause pronounced rises in the rivers, but bankful stages were not reached and the rises were quite beneficial. Rains in southwestern Missouri and northwestern Arkansas were rather heavy on the 7th and 8th and caused bankful stages in the Black, White, and Petit Jean Rivers. In eastern Texas, also, there was enough rain to materially increase the volume of water carried by the rivers, and at a few places the Trinity overflowed very slightly, without causing any damage. Probably the rises of the greatest importance occurred in Arizona, and are reported by the official in charge of the Weather Bureau office at Phoenix as follows:

As a result of heavy rains in southern Arizona from the 11th to the 16th, flashy rises occurred at a number of places in tributaries of the Gila River and at headwaters of that stream. The Salt River at Phoenix attained a stage of 6.2 feet on the 15th and continued above flood stage, 5.0 feet, on the 16th, the stage on the morning of the 16th being 5.3 feet. The greater part of the water came from the Verde River, a tributary of the Salt. Very little water was received from the Salt, owing to the storage dams on that stream.

Heavy rains in the drainage area of the San Pedro, a tributary of the upper Gila, caused a considerable rise at Kelvin (a short distance below the Coolidge Dam), which reached a height of 6.5 feet on the 16th; after this there was a rapid fall. The flood stage at Kelvin is 5.0 feet.

As little water came from the Hassayampa River, and the greater part of that from the Agua Fria was impounded by the Pleasant Irrigation Dam, there was no marked rise in the lower Gila.

Two men were drowned in the Verde River by the overturning of a boat. Unusually heavy rain at Wellton, near Yuma, was followed by a rush of water from a "wash" near that place. A trestle and some of the roadbed of the Southern Pacific Railway were carried out, causing damage to the extent of about $30,000.

A table of flood stages and crests is given below.

In most of the Mississippi system low river stages still prevail. Usually, low February levels above Cairo are caused by ice, but in the winter just ending there has been less ice than is customary. At Sioux City, Iowa, the channel of the Missouri was not closed at any time. The Sioux City records extend to 1855, and at only one other time, in 1888–89, did the channel remain open through the winter. Early in February the ice had run out of the Missouri as far north as Chamberlain, S. Dak.

The following reports from officials in charge of Weather Bureau offices are considered of interest:

Pittsburgh, Pa.—Precipitation during February was light, but was sufficient during the second and third weeks to create considerable run-off. The smaller tributaries were running strong for several days, and the Ohio at Pittsburgh rose to a stage of 14.4 feet on the 21st—the highest stage since April 23, 1930. Wells, springs, and some small streams that dried up during the fall are running again.

Cincinnati, Ohio.—For the last three months—November, December, and January—the rainfall in and around Cincinnati actually was less than the normal January rainfall alone. This emphasizes the increasing gravity of the situation.

Farmers right now are hauling more water for their suffering stock, and for themselves, than they hauled at the peak of the drought last summer.

Hamilton County commissioners have been informed within the last week that tank wagons are carrying 50,000 gallons of water a day from the county pipe lines to farms and residences without water. An increase to 60,000 gallons daily is imminent.

Memphis, Tenn.—Rivers here are already feeling the effects of the dry weather. The Mississippi River is the lowest in the past 12 years and cargo barges are having difficulty in negotiating narrows and shallows. A majority of the river firms have been loading their barges only to half capacity in order to insure swift and safe trips.

Table of flood stages in February, 1931

River and station	Flood stage	Above flood stage—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI DRAINAGE					
	Feet			*Feet*	
Black: Black Rock, Ark	14.0	9	10	15.6	10
White: Batesville, Ark	23.0	9	10	23.8	10
Petit Jean: Danville, Ark	20.0	10	11	20.8	11
		15	16	20.7	15
		24	25	21.3	24
WEST GULF DRAINAGE					
Trinity:					
Dallas, Tex	28.0	25	26	29.4	26
Liberty, Tex	25.0	12	12	25.2	12
PACIFIC DRAINAGE					
Gila: Kelvin, Ariz	5.0	15	16	6.5	16
Salt: Phoenix, Ariz	5.0	15	16	6.2	15

WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

NORTH ATLANTIC OCEAN

By F. A. YOUNG

February is normally one of the stormiest months of the year over the North Atlantic, and the conditions during the current month could not be called exceptional, although there were a number of severe disturbances that will be referred to later. The number of days with gales was not far from normal west of the fortieth meridian, north of the thirtieth parallel, and somewhat below over the middle and eastern sections of the steamer lanes. The North Atlantic HIGH was unusually well developed, as indicated by the large positive departure at Horta, shown in Table 1.

Fog was much more prevalent than during the preceding two months, and the number of days on which it was reported in different localities is as follows. Over the Grand Banks, from 6 to 12 days; along the American coast, between the thirtieth and forty-fifth parallels, from 2 to 5 days; over the steamer lanes between the twentieth and forty-fifth meridians, from 1 to 5 days; along the European coast, from 1 to 3 days; in the Gulf of Mexico, from 1 to 2 days.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level, 8 a. m. (seventy-fifth meridian), North Atlantic Ocean February, 1931*

Stations	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Julianehaab, Greenland	29.66	(1)	30.46	27th	29.06	3d.
Belle Isle, Newfoundland	29.87	+0.12	30.66	19th	29.34	28th.
Halifax, Nova Scotia	29.87	−0.04	30.52	8th	29.32	23d.
Nantucket	29.96	−0.04	30.42	7th	29.64	14th.
Hatteras	30.07	−0.04	30.30	12th	29.82	14th.
Key West	30.03	−0.07	30.20	7th	29.82	25th.
New Orleans	30.07	−0.06	30.30	15th	29.76	24th.
Cape Gracias, Nicaragua	29.93	−0.06	29.98	13th [4]	29.86	16th.
Turks Island	30.04	−0.04	30.16	7th [4]	29.84	4th.
Bermuda	29.95	−0.17	30.38	13th	29.30	26th.
Horta, Azores	30.41	+0.28	30.78	12th	30.08	22d.
Lerwick, Shetland Islands	29.54	−0.18	30.32	3d	28.91	20th.
Valencia, Ireland	29.98	+0.08	30.32	3d [4]	29.59	8th.
London	29.92	−0.08	30.37	24th	29.22	16th.

[1] No normal available.
[2] From normal shown on Hydrographic Office Pilot Charts, based on observations at Greenwich mean noon, or 7 a. m., seventy-fifth meridian time.
[3] From normals based on 8 a. m. observations.
[4] And on other date or dates.

On the 1st a fairly deep depression was central near the south coast of Greenland, with a secondary LOW over the North Sea, and moderate gales prevailed over the central section of the steamer lanes and off the west coasts of France and England.

On the 3d there was evidently a redevelopment of the Greenland LOW, and on that date moderate to strong westerly gales occurred in the southerly quadrants. This LOW moved slowly eastward, and on the 5th was central near 52° N., 22° W.

A moderate depression that on the 7th was over the eastern section of the steamer lanes developed into a severe disturbance, as on the 8th vessels near the center reported westerly winds of hurricane force. On the 9th and 10th stormy conditions continued over the central section of the ocean, and on the latter date as well as on the 11th northerly gales were reported west of the seventieth meridian, between the twenty-fifth and fortieth parallels, and from the 10th to 12th heavy weather was also encountered off the west coast of Europe.

On the 13th and 14th moderate conditions prevailed over the ocean as a whole, with the exception of gales over a limited area about 500 miles east of the Bermudas, while on the 13th land stations on the British Isles reported northerly winds of force 7 and 8.

On the 15th Sydney, Nova Scotia, was near the center of a well-developed LOW, and on the same date a secondary was over the Bermudas, while severe gales were encountered by vessels in the intermediate region. According to press reports three vessels were beached, one sunk, and others damaged in the vicinity of Hampton Roads during the storm.

On the 16th and 17th strong to whole northerly gales again prevailed along the coast of Europe, the storm area extending from the forty-fifth to fifty-seventh parallels, while moderate conditions were the rule over the remainder of the ocean.

On the 18th a depression was central about midway between the Azores and Bermudas that increased in intensity as it moved slowly eastward, and on the 19th and 20th gales of force 8 to 10 were encountered by vessels between the thirtieth and fortieth meridians. On the 20th northwesterly gales also occurred over the eastern section of the northern steamer lanes.

Charts VIII and IX show the conditions on the 22d and 23d, respectively, when a very severe and extensive disturbance prevailed over the western section of the ocean. By the 24th this storm had decreased considerably both in extent and intensity, and on the 25th moderate weather prevailed generally.